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PATENT

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : Ryoo, *et al.*
Appl. No. : 10/004,350
Filed : October 25, 2001
For : CARBON MOLECULAR SIEVE
AND PROCESS FOR
PREPARING THE SAME
Examiner : Stuart L. Hedrickson
Group Art Unit : 1754

CERTIFICATE OF MAILING

I hereby certify that this correspondence and all marked attachments are being deposited with the United States Postal Service as first-class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on

3/1/04

(Date)

Mincheol Kim, Reg. No. 51,306

DECLARATION UNDER 37 C.F.R. § 1.131

1. I, the undersigned, am an inventor of the subject matter claimed in this application.
2. This declaration is to establish the status of the invention in the above-identified U.S. patent application with respect to Jun *et al.*, "Synthesis of New, Nanoporous Carbon with Hexagonally Ordered Mesostructure", J. Am. Chem. Soc. 2000, 122 10712 (hereinafter "Jun"), which was relied on by the Examiner in the September 29, 2003 Office Action of this application.
3. I am familiar with the patent application. The claimed invention of the patent application resulted from the research conducted by the three named inventors of the present application. More specifically, Ryoo Ryung, Ph.D., a professor at Korea Advanced Institute of Science & Technology (KAIST) in Daejon, Korea lead the research, and supervised and guided the work of the other two co-inventors.
4. Prior to October 12, 2000, the claimed invention was complete. Attached to this Declaration is a copy of research notebook pages recorded as the research was conducted. Pages 1 and 2 of the attachment show the processes for synthesizing the carbon molecular sieves referred to in the present specification as CMK-3 and CMK-5, respectively. Pages 1 and 2 were recorded by Sang Hoon Joo. Pages 3 and 4 of the attachment are XRD graphs of the CMK-3 and CMK-5 molecular sieves synthesized by the processes of the foregoing notebook pages. The X-rays for the XRD graphs of Pages 3 and 4 were taken also by Sang Hoon Joo.

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5. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful, false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful, false statements may jeopardize the validity of the application or any patent resulting therefrom.

Dated: February 29, 2004

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Attachment

Page 1

< JSH 200 >

Synthesis of carbon structure from SBA-15 template
(preliminary test)

- determination of optimum amount of sucrose
during first deposition of sugar.

- SBA-15 (SBA-15 # t by S.H. J. Shin estimated)

A (1.25:1) B (1.5:1) C (1.6:1) D (1.7:1)

SBA-15	0.15	0.11	0.11	0.15
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sucrose	0.188	0.221	0.24	0.241
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H_2SO_4 0.023 ml $\xrightarrow{\hspace{1cm}}$

H_2O 0.75 $\xrightarrow{\hspace{1cm}}$

~~CO2~~ ~~100 °C~~

- 1st deposition.

a.m. 10:30 ~

r.t $\xrightarrow{4h}$ 100°C $\xrightarrow{2h}$ 100°C $\xrightarrow{1h}$ 140°C $\xrightarrow{2h}$ 140°C
 $\xrightarrow{1h}$ 160°C $\xrightarrow{6h}$ 160°C

- 2nd deposition.

p.m. 4:20 ~

r.t $\xrightarrow{4h}$ 100°C $\xrightarrow{2h}$ 100°C $\xrightarrow{1h}$ 140°C $\xrightarrow{2h}$ 140°C

* C, D \leftarrow 1st deposition $\xrightarrow{3}$ 140°C $\xrightarrow{3}$ 140°C

<JS4 685-686>

Synthesis of CMK-5 (see KTW 172)

- Furfuryl alcohol per AISBA-15 : 0.87 ml/g

	JS4 685	JS4 686
AISBA-15	JS4 674-A1, <u>2g</u>	JS4 681-A1, <u>2g</u>
furfuryl alcohol (F.A.)	1.74 ml	1.74 ml

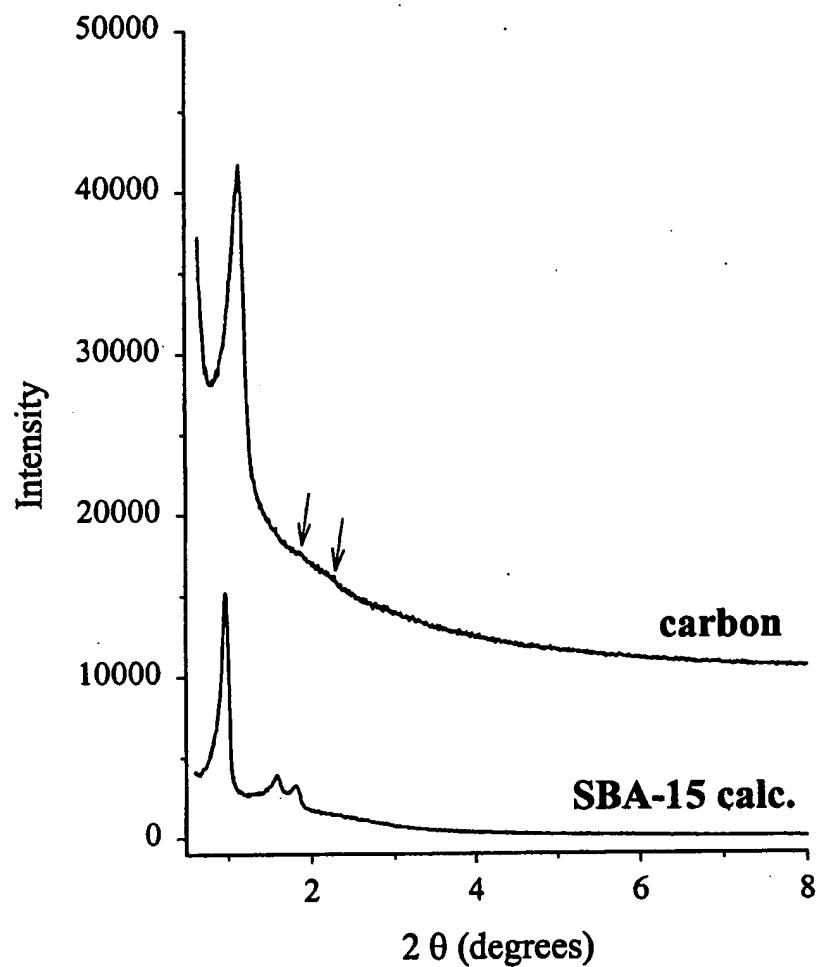
(Procedure)

- (i) Furfuryl alcohol was added to AISBA-15 in PP bottle by pipett.
- (ii) The FA/SBA-15 was vigorously mixed by Vortex and ~~scrapped~~ by spatula.
- (iii) The sample was transferred to quartz reactor, and was subjected to freeze-vacuum-thaw three times.
- (iv) The reactor was transferred to 35°C oven, and maintained for 1h, with stopcock opened. The mixture was polymerized at 90°C for 6h.
- (v) The reactor was connected to vacuum rig, and thermal treated with following scheme

$\text{rt} \xrightarrow{1h} 270^{\circ}\text{C} \xrightarrow{3h} 315^{\circ}\text{C} \xrightarrow{4h} 900^{\circ}\text{C} \xrightarrow{2h} 900^{\circ}\text{C}$

- (vi) The carbon silica composites was washed with HF.

Carbon structure from SBA-15



Attachment

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